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Title of the invention:

TITANIUM DIOXIDE AQUEOUS DISPERSION

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[CLAIMS]

1. A titanium dioxide aqueous dispersion, comprising water as a dispersion medium, ultrafine particulate titanium dioxide, and a non-ionic surfactant, wherein a particle surface of the ultrafine particulate titanium dioxide is subjected to a hydrophobic treatment.

2. A titanium dioxide aqueous dispersion according to claim 1, wherein the ultrafine particulate titanium dioxide is contained at 20 to 60 wt%.

3. A titanium dioxide aqueous dispersion according to claim 1, wherein an average particle diameter of the ultrafine particulate titanium dioxide is 10 to 100 nm.

[0018]

[EXAMPLE]

Example 1

While maintaining at room temperature, a titanium tetrachloride aqueous solution (TiO_2 200 g/l) was neutralized with a sodium hydroxide aqueous solution to

precipitate colloidal non-crystalline titanium oxide. Subsequently, the colloidal non-crystalline titanium oxide was aged to obtain a rutile type micro titania sol. The sol was filtered and dried. Then the obtained dry cake was fired at 600°C for 3 hours, wet ground by a Sand mill to form a slurry of the ultrafine particulate titanium dioxide. The slurry was heated to 70°C, and maintained at the temperature, while stirring, added with sodium aluminate at 3% as Al_2O_3 based on the weight of TiO_2, and aged to precipitate and coat a hydrous oxide of aluminum on the titanium dioxide particles. Continuously, while stirring and maintaining at 70°C, sodium stearate was injected at 3% based on the weight of TiO_2, dissolved therein, aged, and cooled to 30°C to coat stearic acid on the titanium dioxide particles. The slurry was filtered, washed, and dried, and thereafter crushed by a Hammer mill to obtain ultrafine particulate titanium dioxide having an average single particle size of 40 nm according to the electron photomicrograph method. 6 weight parts of polyoxyethylene-modified dimethyl polysiloxane was added and mixed in 49 weight parts of purified water, and while stirring this mixture, 45 weight parts of the above mentioned hydrophobic treated ultrafine particulate titanium dioxide was gradually injected therein, and was sufficiently premixed by Dissuper. Next, the pre-mixture was ground by a Sand mill using glass beads as grinding media to obtain an aqueous dispersion (A) having a viscosity of 230 cP.

[0019]

Example 2

The ultrafine particulate titanium dioxide slurry (TiO_2 200 g/l) of Example 1 was heated to 70°C, then, while intensively stirring, added with sodium silicate at 4% as SiO_2 based on the weight of TiO_2, and continuously aged to precipitate and coat hydrous oxide of silicon on the titanium dioxide particles. Furthermore, while intensively stirring the slurry, sodium aluminate was added at 2% as Al_2O_3 based on the weight of TiO_2, and continuously aged to precipitate and coat hydrous aluminum oxide on the titanium dioxide particles. The solid part was filtered, and washed. The washed cake was dried, and crushed by a Hammer mill to obtain ultrafine particulate titanium dioxide powder. While stirring with a Henschel mixer, the ultrafine particulate titanium dioxide powder was added with methylhydrogen polysiloxane at 3% based on the weight of TiO_2, then, hydrophobized by heat treating at 150°C. 6 weight parts of polyoxyethylene sorbitan monostearate was added and mixed in 49 weight parts of purified water, and while stirring the mixture, 45 weight parts of the above mentioned hydrophobic treated ultrafine particulate titanium dioxide was gradually injected therein, and was sufficiently premixed by Dissuper. Next, the pre-mixture was ground by a Sand mill using glass beads as grinding media to obtain an aqueous dispersion (B) having a viscosity of 260 cP.

[0020]

Example 3

The rutile type micro titania sol used in Examples 1 was filtered and dried to form a hydrous titanium aqueous slurry having a concentration of 200 g/l as TiO_2. The slurry was heated to 70°C and, while intensively stirring, added

with iron sulfate solution (Fe concentration 50 g/l) at 7 wt% as Fe with respect to TiO_2 over 30 minutes, then added with a sodium hydroxide aqueous solution over 40 minutes to adjust the pH to 9, thereby to precipitate and coat hydrous iron oxide on the hydrous titanium particle surface. Then, the slurry was aged for 60 minutes, filtered, and washed. The obtained dried cake was fired at 600°C for 3 hours, wet ground by a Sand mill, to form a slurry of ultrafine titanium dioxide particle. Continuously, Al_2O_3 and stearic acid were precipitated and coated on the titanium dioxide particles in the same manner as in Example 1. The titanium dioxide particles were filtered, washed, and dried, and thereafter crushed by a Hammer mill to obtain ultrafine particulate titanium dioxide having an average single particle diameter of 40 nm according to the electron photomicrograph method. 6 weight parts of polyoxyethylene sorbitan monostearate was added and mixed in 49 weight parts of purified water, and while stirring the mixture, 45 weight parts of the above mentioned hydrophobic treated ultrafine particulate titanium dioxide was gradually injected therein, and was sufficiently premixed by Dissuper. Next, the pre-mixture was ground by a Sand mill using glass beads as grinding media to obtain an aqueous dispersion (C) having a viscosity of 150 cP.

	Sample	Hydrophobic treatment	Surfactant	Dilution	Absorption coefficient (l/g·cm)		
					Visible light region 550 nm	Ultraviolet A region 360 nm	Ultraviolet B region 308 nm
Ex. 1	A	Yes	Nonionic	Saline solution	3.4	21.1	39.6
				Purified water	3.6	21.0	39.0
Ex. 2	B	Yes	Nonionic	Saline solution	3.2	21.0	38.5
				Purified water	3.4	20.3	37.8
Ex. 3	C	Yes	Nonionic	Saline solution	4.9	20.0	39.6
				Purified water	5.1	23.4	38.3
Comp. ex. 1	D	Yes	Ionic	Saline solution	0.8	3.9	5.5
				Purified water	3.5	19.7	37.7
Comp. Ex. 2	E	No	Nonionic	Saline solution	8.3	12.2	15.9
				Purified water	6.7	11.5	14.7